

REMARKS

Claims 1-20 were previously pending. By way of this Response, Claims 6 and 10 have been canceled and their subject matter has been added to the pending independent claims. Claims 1-2, 7-8 and 11-20 have been editorially amended in accordance with the helpful suggestions stated in the Action and to render the claims more definite. Further, all of the amendments clarify the previously claimed invention and do not add any substantive new examination issues for the Examiner to consider that were not already previously considered due to the previously pending claims.

Claim Rejections – 35 USC § 112

Applicant appreciates the helpful suggestions contained in Paragraph 3 of the Action. Applicant has attended to each of the formality rejections stated in the Action and believes that the amended claims are now in condition for allowance or better form for appeal.

Claim Rejections – 35 USC § 102/103

§ 102/103 REJECTION OVER SAMULON, ET AL (U.S. PATENT 3,076,861):

Claims 1-14, 17, 18 and 20 were rejected under § 102(b)/ § 103(a) as anticipated by/as being obvious over Samulon. This rejection is respectfully traversed.

The following language is taken directly from the specification at page 3, lines 1-10:

“Further, attempts have been made to prevent certain large portions or bands of the solar spectrum outside of the photoreactive portion thereof from being incident on solar cells. In particular, various known techniques attempt to block entire portions or bands of the solar spectrum that are typically regarded as being above and/or below the photoreactive portion of the solar system (e.g., above and/or below the visible light or optical portions of the solar spectrum to which the photovoltaic substrate is favorably sensitive). For example, these techniques attempt to minimize undesirable interactions of the solar spectrum with the solar cells which include minimizing undesirable heating from the infrared portion of the solar spectrum and minimizing undesirable physical degradation from the ultraviolet portion of the solar spectrum.”

This language has been excerpted because it more or less parallels the general disclosure of Samulon, as well as the other related and cited prior art references. In particular, each of the previously pending claims (as well as the currently amended claims) made express reference (either directly or indirectly) to a particular portion of the solar spectrum. In this regard, the meaning for

the phrase “photoreactive portion” of the solar spectrum is disclosed expressly at page 13, lines 9-14, which is reproduced below for the convenience of the Examiner:

“Figure 1 shows a typical output response within the photoreactive portion of the solar spectrum for a crystalline silicon solar cell. In this regard, the x-axis corresponds to wavelengths from about **300 nanometers to about 1400 nanometers**, which is about the typically desired response range within the **photoreactive portion** of the solar spectrum that traditional solar cell manufacturers have sought for the photovoltaic material(s) comprising the solar cell. The y-axis corresponds to a particular output present at various measured wavelengths along the x-axis.” (*Emphasis added.*)

Each of the pending claims also includes the phrase “destructively interfering.” The importance of “restricting,” “reducing,” “minimizing,” or “limiting” approximately only the **destructively interfering wavelengths within the photoreactive portion** of the solar spectrum has not been disclosed or suggested by any of the prior art. A portion of the present specification that discusses the potential negative implications of allowing destructively interfering energies within the photoreactive portion of the solar spectrum to be incident upon a photovoltaic substrate occurs at page 13, line 30 – page 15, line 9, reproduced in its entirety below for the convenience of the Examiner.

“Figure 3 shows two different incident sine waves 1 and 2 which correspond to two different energies, wavelengths λ_1 and λ_2 (and thus different frequencies) of light (or photons) within the photoreactive portion of the solar spectrum which could be made to be incident upon the surface of a photovoltaic solar cell substrate material. Each of the sine waves 1 and 2 has a different differential equation which describes its individual motion. However, when the sine waves are combined into the resultant additive wave 1+2, the resulting complex differential equation, which describes the resultant combined energies, actually results in certain of the input energies being high (i.e., constructive interference) at certain points in time, as well as being low (i.e., destructive interference) at certain points in time.

In particular, assuming that the sine wave 1 corresponds to desirable incident energy within the photoreactive portion of the solar spectrum having a wavelength λ_1 , which would result in positive or favorable effects if permitted to be incident on a solar cell substrate; and further assuming that the sine wave 2 corresponds to undesirable incident energy within the photoreactive portion of the solar spectrum having a wavelength λ_2 , which would not result in positive or favorable effects if permitted to be incident on a solar cell substrate, then the resultant additive wave 1+2 shows some interesting characteristics. For example, the portions “X” represent areas where the two waves 1 and 2 have at least partially constructively interfered, whereas the portions “Y” represent areas where the two waves 1 and 2 have at least

partially destructively interfered. Depending upon whether the portions “X” corresponds to desirable or undesirable wavelengths (i.e., resulting in positive or negative interactions with the substrate, respectively) then the portions “X” could enhance a positive effect in a substrate or could enhance a negative effect in a substrate. Similarly, depending on whether the portions “Y” correspond to desirable or undesirable wavelengths, then the portions “Y” may correspond to the effective loss of either a positive or negative effect.

It should be clear from this particular analysis that partial or complete constructive interferences (i.e., the points “X”) could maximize both positive and negative effects and that partial or complete destructive interferences “Y” could minimize both positive and negative effects. Accordingly, in this simplified example, by permitting predominantly desirable wavelengths λ_1 to be incident upon a semiconductor surface, the possibilities of negative effects resulting from the combination of waves 1 and 2 would be minimized or eliminated. In this regard, it is noted that in practice many desirable incident wavelengths within the photoreactive portion of the solar spectrum can be made to be incident on a surface of a photovoltaic substrate material. Moreover, it should also be clear that positive or desirable effects include, but are not limited to, those effects resulting from an interaction (e.g., heterodyne, resonance, additive wave, subtractive wave, partially or substantially complete constructive interference or partially or substantially complete destructive interference) between a wavelength or frequency of incident light and a wavelength (e.g., atomic and/or molecular, etc.), frequency or property (e.g., Stark effects, Zeeman effects, etc.) inherent to the substrate itself. ***Thus, by maximizing the desirable wavelengths (or minimizing undesirable wavelengths) within the photoreactive portion of the solar spectrum, solar cell efficiencies never before known can be achieved. Alternatively stated, certain destructive interference effects resulting from the combinations of different energies, frequencies and/or wavelengths can reduce the output in a solar cell photovoltaic substrate material. The present invention attempts to mask or screen as many of such undesirable energies (or wavelengths) as possible from becoming incident on the surface of a photovoltaic substrate*** and thus strive for, for example, the synergistic results that can occur due to, for example, desirable constructive interference effects between the incident wavelengths of light.” ***[Emphasis added.]***

Accordingly, the disclosure of Samulon only generally corresponds to prior art which Applicant discussed in the “Background of the Invention” portion of Applicant’s present specification. Specifically, Samulon teaches that in some instances certain blocks or regions of incident sunlight ***outside*** of the photoreactive portion may be desirable to prevent from contacting a photovoltaic material. Further, Samulon is completely silent regarding any possible negative interactions which occur due to ***“destructively interfering”*** frequencies of light. That is contrasted

with Applicant's claimed invention which recognizes that a portion of the "photoreactive portion of the solar spectrum" needs to be modified by excluding destructively interfering frequencies (see currently pending independent claims 1, 14 and 15).

Accordingly, since Samulon does not disclose or suggest Applicant's claimed inventive concepts of: (1) Claim 1: "...at least one means for modifying at least a portion of the photoreactive portion of the solar spectrum..." by restricting "...approximately only destructively interfering frequencies of light..."; (2) Claim 14: "...determining...destructively interfering energies..." coming from "...at least a portion of the photoreactive portion of the solar spectrum..." and restricting "...approximately only destructively interfering incident frequencies..."; and/or Claim 15: "...determining destructively interfering energies from at least a portion of the photoreactive portion of the solar spectrum..." and "whereby substantially all of said destructively interfering energies not corresponding to said determined at least one primary and said determined at least one harmonic and at least one heterodyne are determined", the § 102/103 rejection over Samulon is respectfully requested to be withdrawn.

§ 102/103 REJECTION OVER STREBKOV, ET AL (U.S. PATENT 4,151,005):

Similar to Samulon, Strebkov also parallels generally that which was discussed in the present specification as "Background." Strebkov does not disclose or suggest the importance of, for example, modifying at least a portion of the **photoreactive portion** of the solar spectrum of sunlight by restricting destructively interfering frequencies (see claim 1); or determining destructively interfering energies coming from at least a portion of the photoreactive portion of the solar spectrum (see claims 14 and 15). Accordingly, Strebkov is also deficient and should be withdrawn as a reference.

§ 102/103 REJECTION OVER HASHIMOTO (U.S. PATENT 4,963,196):

Similar to both Samulon and Strebkov, Hashimoto also parallels generally that which was discussed in the present specification as "Background." Hashimoto does not disclose or suggest the importance of, for example, modifying at least a portion of the **photoreactive portion** of the solar spectrum of sunlight by restricting destructively interfering frequencies (see claim 1); or determining destructively interfering energies coming from at least a portion of the photoreactive portion of the solar spectrum (see claims 14 and 15). Accordingly, Hashimoto is also deficient and should be withdrawn as a reference.

§ 102/103 REJECTION OVER AGUILERA, ET AL (U.S. PATENT 6,107,564):

Similar to Samulon , Strebkov and Hashimoto, Aguilera also parallels generally that which was discussed in the present specification as “Background.” Aguilera does not disclose or suggest the importance of, for example, modifying at least a portion of the **photoreactive portion** of the solar spectrum of sunlight by restricting destructively interfering frequencies (see claim 1); or determining destructively interfering energies coming from at least a portion of the photoreactive portion of the solar spectrum (see claims 14 and 15). Accordingly, Aguilera is also deficient and should be withdrawn as a reference.

Claim Rejections – 35 USC § 103

Claims 15, 16 and 19 were rejected under § 103 as anticipated by/as being obvious over Samulon. This rejection is respectfully traversed.

As discussed above, the disclosure of Samulon only generally corresponds to prior art which Applicant discussed in the “Background of the Invention” portion of Applicant’s present specification. Specifically, Samulon teaches that in some instances certain blocks or regions of incident sunlight **outside** of the photoreactive portion may be desirable to prevent from contacting a photovoltaic material. That is contrasted with Applicant’s claimed invention which recognizes that a portion of the “photoreactive portion of the solar spectrum” needs to be modified by restricting destructively interfering frequencies/energies (see currently pending independent claims 1, 14 and 15).

Double Patenting

Applicant notes that claims 1-20 were provisionally rejected under the grounds of nonstatutory obviousness-type double patenting. Applicant notes that the provisional obviousness-type double patenting rejection should perhaps now be an actual obviousness-type double patenting rejection since Application 10/478,189 is now U.S. Patent No. 7,161,083.

In order to overcome the anticipated obviousness-type double-patenting rejection, Applicant hereby encloses a fully executed Terminal Disclaimer.

Conclusion

Applicant appreciates the detailed reasoning of the Examiner set forth in the Action. However, Applicant believes that the above comments render each of the art rejections moot. Specifically, all the cited references, at best, correspond to the Background of the Invention


discussion contained in Applicant's disclosure. Specifically, none of the cited references disclose or suggest that certain "destructively interfering" frequencies/energies occur within the "photoreactive portion of the solar spectrum." Thus, certain destructive interference will occur in a photovoltaic substrate absent the claimed interactions with certain wavelengths/frequencies/energies within the photoreactive portion of incident sunlight.

Accordingly, Applicant respectfully submits that all of the § 112, § 102 and § 103 rejections have been overcome.

In addition, the attached Terminal Disclaimer renders the anticipated obviousness-type double patenting rejection moot. Accordingly, Applicant respectfully requests a Notice of Allowance directed to claims 1-5, 7-9 and 11-20.

Should the Examiner desire to discuss this Amendment, the Examiner is invited to telephone Applicant's undersigned representative at the number listed below.

Respectfully submitted,


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